

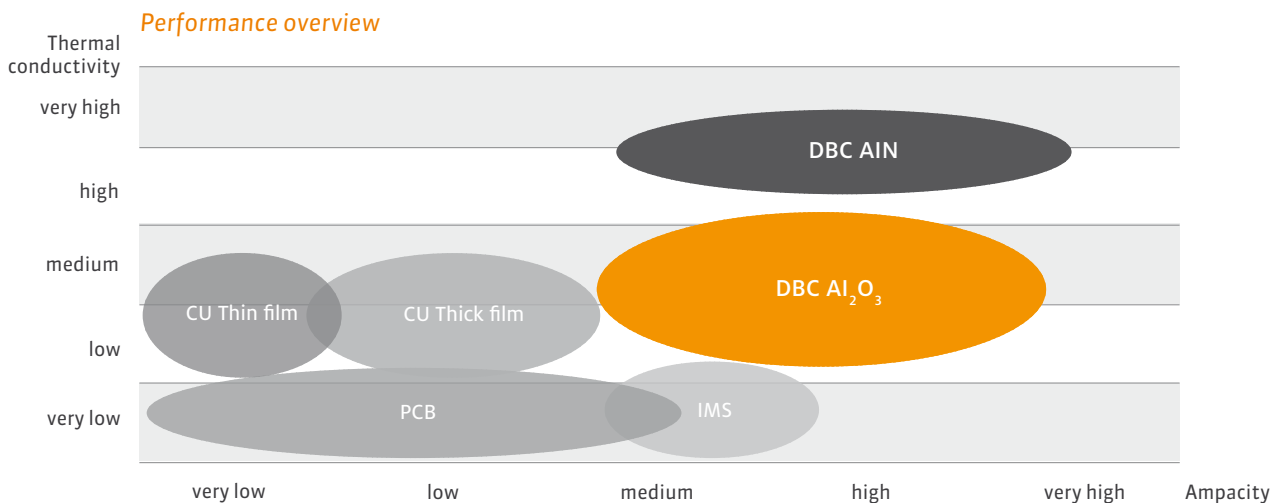
Direct bonded copper (DBC) substrates consist of a ceramic isolator, Al_2O_3 (aluminium oxide) or AlN (aluminium nitride), to which pure copper is applied in a high temperature melting and diffusion process. The result is a non-detachable connection of copper and ceramics.

Due to the high heat conductivity of Al_2O_3 (24 W/mK) and AlN (130 to 180 W/mK) and the excellent heat capacity of the thick copper coating (200 - 600 μm) DBC substrates are ideally suited for high power electronics. The temperature coefficient of expansion (TCE) of Al_2O_3 and AlN closely matches that of silicon. This minimizes the mechanical stress in the bare silicon die which is attached to the substrate since the TCE of DBC Al_2O_3 and AlN are much closer to that of silicon than other materials.

curamik produces DBCs in master cards with dimensions of 5.5"x7.5" for a more efficient chip soldering and wire bonding, but also single pieces DBC.

Advantages:

- // Extraordinary heat dissipating capability and temperature resistance
- // High isolation voltage
- // Excellent heat spreading
- // Adjusted expansion coefficient enables chip on board
- // Efficient chip soldering and wire bonding directly on the master card

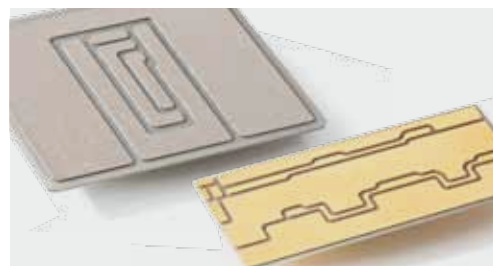
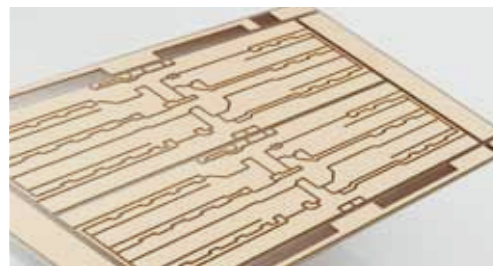


AlN-DBC-Substrates

AlN combines excellent thermal conductivity and good mechanical stability. Another advantage of AlN compared to Al_2O_3 is its adjusted thermal expansion coefficient, which is closer to that of silicon and thus hardly causes any thermal tension in the solder layer between the chip and the substrate.

DBC substrates based on AlN ceramics are mainly used in applications with very high operational voltages at high partial discharge resistance and very high reliability prerequisites, such as

- // traction
- // aviation
- // industrial semi-conductor modules with high power density



Al_2O_3 -DBC-Substrates

The heat conductivity of Al_2O_3 DBC substrates is decisively determined by the heat conductivity and thickness of the used ceramics. Therefore, Al_2O_3 DBC substrates are offered with different ceramic features and thicknesses (0.25 – 1.00 mm) for customer-specific applications.

Al_2O_3 ceramic based substrates are standard products with the best price performance ratio. They are mainly used in applications of medium and lower output areas, such as

- // general power electronics
- // concentrated photovoltaics (CPV)
- // Peltier elements
- // semiconductor modules for automotive applications

